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MONOGRAPH

ON THE

BRASS AND COPPER WARE

OF THE

CENTRAL PROVINCES.

1894.

Published by Authority.



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Bombay:

PRINTED AT THE

EDUCATION SOCIETY'S STEAM PRESS, BYCULLA.

1894.



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THE
BRASS AND COPPER WARE
OF THE
CENTRAL PROVINCES.

1. There does not appear to have been in former times any considerable brass or copper industry in the Central Provinces. Before the recent development of communications there was no risk that imported goods would undersell the articles of local manufacture, and among a people not desirous of obtaining utensils of any high artistic merit, there would be no reason, apart from a reduction in cost, in favour of any other source of supply than primitive village industries, each supplying its neighbourhood. We may thus, in the absence of adequate information, conclude that in the past in most parts of the Central Provinces, as at present in several districts, the brass and copper industry was limited to a few household articles of every-day use, made in a few villages in each district and shewing no marked tendency to develop into a more flourishing industry.

2. The Central Provinces Census Report for 1891 shows the number of brass and copper brass and copper smiths in the Provinces to be 17,776, and smiths in the Feudatory States to be 3,145. In paragraph 229 of the Report it is stated in respect of brass and copper smiths:—

“ Amongst these the principal castes are the Kaseras or Kasars, 10,489, who take their name from the bell-metal in which they work: the Tameras, or workers in copper, 3,677; Otaris or Warkaris, 1,535; Khadras, 2,042; Bharewas, 1,713; and Aundhias, 1,002. It is of interest to note that in the three Northern districts of Saugor, Damoh, and Jubbulpore, almost the sole representatives of the craft are the Tameras or copper-workers, and the same is also the case, though to a less extent, in Narsingpur. On the other hand throughout the Maratha districts, the workers in bell-metal, of which both the Kasar and Otari are founders and casters, hold almost undisputed sway. The distinction is probably more nominal than real, as both classes of workmen use copper and bell-metal in the manufacture of their wares. In Mandla the Bharewas are the makers of the bell-metal vessels, for which the place has a reputation. Of the Aundhias, Seoni returns considerably more than half—597, while the Kadras are found almost solely in Sambalpur and the Uria States. Sambalpur, it may be observed, returns a much larger proportion of workers in the baser metals than any other district in the Province, and a similar high average of these artificers is noticeable in some of the Uria States, particularly Raigarh and Sonpur.”

Besides the castes that make up the figure of 17,776 quoted above, it would appear that in some districts Sonars also work in alloys of copper. The Jubbulpore report on the brass and copper wares of the district states that all Tameras are not artisans, *i.e.*, they themselves do not work in brass and copper. There are two classes among them, the Mahajani or Capitalist class, and the working or artisan class. The latter, as a rule, do not keep any shop for sale of ware. They make vessels and articles on hire for the former class, who supply raw material to them and pay them at a fixed rate for their labor. The artisan Tamera makes vessels out of brass sheets by hammering, while the Sonar works in alloys of copper by moulding or casting. The Mahajani or capitalist Tamera patronizes both the classes of artisans, and keeps shop for the sale of the wares made by them.

3. It appears that the ancestors of the Kaseras or Kasars lived in Chanderhi in Bundelkhand, whence they proceeded first to Mandla and afterwards to some other places of the Central Provinces (see page 116, Volume II of Mr. Sherring's “Hindu Tribes and Castes”). The fact that the language of

Kaseras is Hindi, and that they are under the spiritual guidance of certain Kanauja Brahmins of Bundelkhand, seem to proclaim their Northern origin. The following details are furnished by the Hoshangabad Report : -

The Kaseras of this District suppose that they are a section of the Chhatri caste, and their habits and mode of life certainly suggest that they are not much below Brahmins in the social scale. They bathe and worship every day, wear the sacred thread, abstain scrupulously from animal food and drink. There is a general prejudice among them against the use of even onions and garlic, but the use of these articles of food does not involve loss of caste. The food prepared by them is eaten by their Brahmin priests, and this is a fact which more than anything else shows that the Brahmin does not look upon a Kasera as very much his inferior. Widow-marriage too was unknown among the Kaseras till 40 or 50 years ago. But instances of Kasera widows going wrong with persons of inferior castes having occurred, the caste Punchayet determined to remove the time-honored but cruel restriction on the re-marriage of widows.

The sacred thread is given to Kasera boys between the ages of 11 and 16. The ceremony (called Harnam) corresponds to the *Munj* ceremony of the Brahmin although, of course, it is not half so elaborate. The Brahmin priest who presides over the ceremony teaches the initiate to learn by heart certain *Mantras* and resides with him until he is able to repeat them from memory. The ceremony itself occupies only a single day, but the priest resides with the initiate for 2 or 3 days. From 1 to 25 Rupees is the expenditure on the ceremony.

The marriageable age of girls is generally taken to be 9 or 10 years, and no girl is allowed to reach maturity without being married. Boys are married between the ages of 12 and 16, and the marriage expenditure is from 50 to 150 Rupees. The marriage celebration lasts from 5 to 8 days. No Kasar woman does any other than her own household work. The Kasera dead are cremated and never buried; cremation and funeral ceremonies cost together from 5 to 30 Rupees.

The special priest of the Kasera community is always a member of the Imari class of the Kanauja Brahmins of Saugor, Muradpur (in Saugor), Budnor (in Bundelkhand), and Lodhikhera (in Nagpur). The priestly work of these Kanauja Brahmins is confined to that community, and they pay periodical visits to this District and preside over the Harnam and marriage ceremonies. The priest gets from 8 annas to 5 Rupees for a Harnam ceremony, and from 10 to 40 Rupees for a marriage ceremony. It is not necessary that the special priest should preside over the funeral ceremonies. The local Brahmin priests of whatever class can preside on such occasions. The tutelary deity of the Kaseras is a goddess of the name of Singh Bhavani, who is worshipped twice a year. On both occasions the Kaseras' trade implements are worshipped along with the goddess. The claims of the other Hindu gods also are not ignored, and they are paid their due allegiance at the proper times.

Kaseras, as a class, do not care for education. Those who send their boys to school care to give them only as much education as is necessary to enable them to read, write, and cast up. English is rarely taught. Very few Kaseras have taken to cultivation or other craft or become land-owners. The community generally depends for its livelihood on its own special craft, and it can afford to do so as long as there is not much foreign competition to share in its profits.

The caste influence among Kaseras is as strong as it is in any other self-contained uneducated section of the Hindu community. A breach of the caste rules is punished with a fine of from 1 to 25 Rupees, and the delinquent is also required to give 2 or 3 feasts for re-admission into caste. The eating and drinking of forbidden food and drinks, adulterous intercourse with persons of the lowest castes and the castration of bullocks or horses are some of the social offences punishable with excommunication. It is also considered sinful to allow Brahmin priests to approach the furnaces in which metals or ores are being melted.

4. The gradual opening up of the Provinces by railways has raised the standard of comfort among the rural classes by giving them a better market Prospects of the Industry. for their agricultural produce. The demand for the products of the brass and copper smiths has thus increased, and at the same time the decreased cost of carriage has tended to specialize the industry to certain districts or portions of districts that possess special advantages in production. The district reports thus shew a declining industry in some and a growing one in other parts of the Provinces. The districts containing the greatest number of brass and copper smiths are Jubbulpore (992), Nagpur (1,565), Bhandara (1,062), Raipur (2,848), Bilaspur (1,327), and Sambalpur (2,602), and among the feudatory States Raigarh and Sonpur possess 793 and 926, respectively.

The Nagpur Report, on the other hand, attributes the decline of the brass and copper industry to hard times and the growth of economic competition, as the following extract will shew :—

“ On the whole prospects of workers in brass and copper are far from bright or gratifying. Had reliable and authentic statistics of this industry in years when it was in a flourishing condition been available, the decay and falling-off of the trade would have been markedly clear beyond possibility of all doubt. But, unfortunately there are neither means nor sources from which comparative statements could be prepared. True it is, however, that the spread of the competitive principles of free-trade and the opening up of communications, which enable consumers to obtain their manufactured brass and copper wares more cheaply, have fatally injured the industry of the local hereditary brass and copper smith classes. Directly open competition and payment by cash come in, the crude and imperfect work of the local brass and copper smiths has no chance in the market, even on the point of cheapness, with the work turned out by large and well-managed metal factories. Under the old village community system the brass and copper metal workers shared in the fortunes of the agricultural community to which they belonged ; now the interests of the two are becoming antagonistic, as those of producer and consumer must ordinarily be. The rise in prices, and especially in the price of food, has also very injuriously affected these classes. They tell doubly against them, for the Zamindars and Rajas and other great landed proprietors, their best and practically, in agricultural communities, their only customers, find themselves compelled to economize and haggle over every pice they spend, while the money itself has not the same purchasing power. The class of middlemen is also gradually coming into more prominence and absorbing its share of what were always only too slender profits. The money-lenders advance money and material to those smiths who are in difficulties and buy up the whole work of their debtors for a certain period. The result, of course, is that the brass and copper smith gets more and more involved in their meshes and finds it utterly impossible to extricate himself from their clutches. Those who work for wages are no better off. They get the same or less wages than they used, and as prices have gone up the food equivalent is always smaller than before. Everywhere the complaint is the same. Native brass and copper smiths did a thriving business in the Maratha times, but there is little demand now for costly ornamental work or even for cheap domestic utensils and pots, as in many cases articles manufactured in factories at Poona and other places have almost destroyed their business. The brass and copper smith hardly gets a single order from the Rajas for large cooking pots, lamp-stands or other ornamental and costly work, whereas in former times he had an abundance of them. And last, though not least, the introduction of glass and china wares, cheap, handy and portable, suitably answering all the necessary purposes, has also contributed towards the decay of articles manufactured by Native brass and copper smiths.”

The Bhandara Report states that the brass and copper industry which was formerly favoured by the abundance of fuel from the surrounding jungle has not suffered from the present scarcity of fuel, and consequent dearness of charcoal, since the opening up of the country by railway extension, has enabled the raw material, in the shape of rolled brass and copper sheets, to be procured cheaply from

Bombay, and has thus dispensed with the necessity for using a considerable supply of fuel in obtaining the raw material by melting down old worn-out utensils.

The Raipur Report states that the opening up of the Chattisgarh region by the railway has made money more plentiful among the people and raised the standard of comfort. Importation of metals has followed and consequent reduced prices. The local manufacture of brass and copper articles has in most cases dwindled under the influence of competition from without. Saugor, with 687 brass and copper smiths, reports a thriving industry with little external competition. The Chanda Report shows a declining industry, but does not specify the cause of the decline. It, however, speaks of the large importations from Bhandara, and it would appear probable that here too the cause of the falling-off in the industry is the inability of the local artisans to turn out articles at the price at which they can be produced and imported from abroad. The cheapened carriage of both raw materials and finished products has tended, as it would naturally do, to specialize in favoured localities an industry that does not call for any high degree of artistic merit or rare technical skill. It is not probable that the decline of the industry is due to the chronic impoverishment of the brass-smiths' customer, since the decline is equally marked in some districts of increasing prosperity and rising standard of comfort.

5. From an artistic point of view the industry shows a falling-off. The

The artistic quality of his work. Nagpur Report attributes the decline of the industry in his district to the competition of a cheaper class of articles of inferior quality that can now be promptly obtained from

Poona or other places of large production; it also expresses the opinion that the deterioration is in great measure due to the demand for enormous quantities of brass-work for the London market at low prices. The native braziers find that articles of common pattern and hasty workmanship find a ready sale, whilst those in their old style of thorough workmanship can scarcely find a purchaser in England at the price necessary for production. The industry in these Provinces is mainly confined to the manufacture of household utensils for every-day use, and in these cases there is little attempt at artistic design. In Saugor and Chanda, however, some works of art of a fair artistic standard are produced. Enamel work or bas-relief, as done in Benares, Muradabad and Cashmere is unknown among the Central Provinces brass and copper smiths.

The Jubbulpore Report states that there are about half a dozen skilful workmen who, receiving no encouragement from the public, and being of limited means, are unable to turn out any artistic workmanship. It suggests that, to prevent their skill dying with them, it would be well to hold occasional Provincial Exhibitions. 'The industry,' it says, 'is a very useful and paying one, and ought to be encouraged.' But it is doubtful how far it would be wise to encourage an industry for the artistic products of which the demand has declined so considerably.

6. Brass ware is generally made from sheets of the raw material imported

The process of manufacture of Brass Ware. from Bombay, the exact composition of which cannot be stated. In Jubbulpore it is said that the brass sheets imported are generally of uniform quality. The prices vary, not on account of the quality of the sheet, but according to their thickness. The sheets are of uniform size and are sold by weight at the rate of Rs. 0-12-3 per seer. Sheets of four different weights are generally imported, weighing 10, 14, 18 and 22 seers respectively, and costing Rs. 7-8-0, Rs. 10-8-0, Rs. 13-8-0, and Rs. 16-8-0 each, respectively. Thin sheets are used for making small vessels and thicker sheets for larger ones.

There are two methods of manufacturing brass-ware—by hammering and by casting. In the former process the sheet is first beaten and flattened with wooden mallets. Discs and rings are marked out on it with compasses according to the size

and dimensions of the article to be made, most articles being made in sections. The pieces so marked out are cut and separated from the sheet with a pair of scissors or a chisel, and are then hammered with a wooden mallet on a stone anvil until each piece assumes the required shape, when the hammer is used to make the sections exactly fit, after they have been heated and joined with solder, the composition of which is 3 parts of brass and 1 part of zinc. When cool, a file is used to polish the joins.

The cuttings of brass are utilized in making solder, rings and rims of vessels.

The second method consists in obtaining molten brass, either by compounding the alloy or by melting up pieces of old brass, and pouring the molten liquid into a mould of the required shape, or not unfrequently allowing it to cool and then hammering it by the first process into the required shape. The following is an interesting description of the method of manufacture of brass-ware at Neri in Chanda district :—

The copper as before mentioned is imported from Bombay in large flat sheets. The zinc is also imported from Bombay in blocks about 16 inches by 10 inches by $\frac{3}{4}$ of an inch and apparently comes originally from Austria. The two metals are taken in a proportion of two parts copper and one part zinc and cut up into small pieces about one inch long by one inch wide. The vessel in which they are to be melted, is made of a mixture of potter's clay, cow dung and horse-dung, and in the shape of a gigantic spinning top, the walls of the vessel being about $\frac{1}{8}$ of an inch in thickness and its capacity about $\frac{1}{2}$ a gallon. It is thoroughly dried and baked to an abnormal hardness, after which it is fit for use. The brass and copper having been placed in it, the utensil is placed in a blacksmith's charcoal furnace and buried in a mound of charcoal. The furnace is now started, and after the metal is thoroughly melted, the utensil is taken out of the furnace with the aid of a large pair of iron pincers and presents a mass of red-hot material with the seething molten liquid within. A hole is now driven in the side of the vessel and it is a marvel, seeing how easily this hole is made, that the utensil can hold the weight of metal it does. From this hole the metal is poured into moulds prepared of the same material as the vessel in which the metals are melted.

Lotas (small water pots) are frequently prepared in this manner. The mould having been broken, the moulded article is displayed to view with a very rough and dull exterior. It is then taken and cleaned on a hand lathe, one man turning the lathe with the vessel at the end, while another with an iron chisel pressed against the article as it turns, removes the rough exterior. A small plane is next used to remove all inequalities and the article is then fit for sale. Plates, dishes and saucers are also manufactured, the liquid being allowed cool into large flat pieces which are subsequently made red-hot and worked into shape. It may be remarked here that articles made from the ware as prepared in the second method are preferred and in more demand to those worked in the first manner or moulded. The moulded article, though to all appearances the better finished, is yet frequently so brittle that a fall on a stone will shiver it into almost as many atoms as toughened glass under a similar calamity.

The Saugor report states that water pots and dishes are made there by the hammering process, while drinking and cooking pots, instruments and idols, toys &c. are mostly cast.

8. The process of casting in that district is as follows :—First, a model of the article to be prepared is made of clay. This is made by hand and dried. Then it is coated with prepared wax consisting of 2 parts of bees'wax, 10 of rosin and 1 of sweet oil. This again is coated with clay, leaving a small hole for the wax to issue from. When dried it is put on the fire, the wax melts and comes out of the hole, leaving the model hollow inside. A clay crucible filled with pieces of brass is fitted to the hole of the model and plastered with clay and dried. Then it is placed on the furnace, the crucible downwards. When the metal liquifies, the model is

turned upside down, the contents of the crucible running down the hollow of the model beneath. On becoming cool the clay is removed and the desired article obtained. The reason alleged for the supersession of locally manufactured brass by imported sheets is not the cheapness of the latter so much as the fact that it can be more easily and rapidly worked upon than the local article, and that the articles made of imported brass possess a better finish.

9. In Saugor, besides brass imported from Bombay, the following kinds are manufactured locally in small quantities :—

Three parts of copper, mixed with two parts of zinc give an alloy of the best quality. It is the most malleable of all the other alloys, and has a yellow colour. This is considered the best *pital* and can only be hammered in a cool state. Several kinds of cast and hammered utensils, ornaments and leaves are made with this compound, but it has been replaced by the Bombay sheets on account of the latter's comparative cheapness.

a. The second alloy consists of 20 parts of copper and 16 of zinc and is lighter in colour. It can be beaten out in a cool as well as in red-hot state. This is used in making utensils for every day use to stand constant rubbing in cleaning them, as it is harder than the first compound.

b. The third alloy consists of 16 parts of copper and 18 of zinc. This is still lighter in colour, and is generally manufactured towards Mirzapur. Cooking pots are usually made with it, but it is prepared in very small quantities in the district, as Mirzapuri pots are imported here.

c. Sixteen parts of copper with 20 parts of zinc give an alloy known as "*Tora*." It is greyish in colour, and generally used in making ornaments for females, such as armlets.

10. Copper utensils are not in much use in these Provinces, as the domestic use of the metal is not regarded with favour by Hindus. **Copper Ware.** Where copper vessels are in demand they are frequently imported from Poona and Cawnpore by Mahomedan traders. Copper vessels are generally tinned before use to avoid risk of poisonous accretions.

11. The method of manufacturing copper articles in Chanda District is described as follows :—

The copper raw material is imported from Nasik in Bombay in large flat sheets, and is worked up into different articles in three different ways. In one the raw material is simply beaten into shape. Plates, *thalis*, cooking and water pots and saucers are chiefly made in this manner. They are, of course, cheap, but the material being thin, they do not last long. In the second method the raw material, after being cut up into blocks about 8 inches square, is made red-hot in a blacksmith's charcoal furnace, and these blocks are welded together by beating on an anvil, the metal being thus thickened and gradually worked into shape. The large kind of water pots (*goonds*) and also many of the smaller *lotas* are worked in this manner. In the third method the vessels are prepared in two parts and subsequently soldered together in the centre. Cooking utensils and other vessels made in this manner are dearer than those prepared by the first method, but they are more in demand, as they are more enduring.

12. Pots made of brass with a copper rim are called "*Gunga Jumni*" after the confluence of the dark water of Jumna with the muddy stream of the Ganges, which union they are supposed to symbolize.

13. Besides brass and copper ware, several articles are manufactured of bell metal—an alloy of copper and tin. In Chanda bell metal is made in identically the same way as brass, but in this case the amalgam is composed of four parts copper to one part tin or tinfoil. The tin is imported from Bombay in coils and is more expensive than copper or zinc, for while copper sells at Rs. 7 a mun (14 seers) and zinc at Rs. 6, tin sells at between Rs. 25 and Rs. 30 for the same weight. Bells of fairly good size and excellent tone are moulded from this amalgam, and plates or saucers in which anything acid in the way of food is to be kept, are also made of it, acids not effecting such ware in the manner that they do brass or copper.

In Jubbulpore bell metal is made of one part of pewter to four of copper. The alloy is made by a section of the *Sonar* caste, distinct from the gold and silver smiths. The method of making the alloy is as follows :—

The materials (copper and pewter) are put in a crucible which is made of clay and crushed rice husks. The mixture is called *bhoosari*. Then a mould is made of a mixture of clay, sand and cow-dung. Great care is taken in making this mixture. The clay in its dry and powdered state is strained so that no grit remains. Then the two are mixed in cow-dung and properly kneaded. The mould is fashioned by hand and is not baked over fire, but dried in the sun, and when dry is turned on a lathe.

The lathe used is a rude contrivance. It is a rolling shaft of wood, worked by a strap of leather, passing two or three times round it, and pulled alternately by either hand. It rests on a wooden support, and at one end a pin fits into a hole in another fixed support. At the other end of the shaft a lump of lac or of rosin is attached. In this district, generally, rosin is used for the purpose, as it is more adhering than lac. The bottom of the dry mould is heated and then applied to this lump of lac or resin, so that the lac or resin softens and the mould adheres to it. When the mould cools down and the lac or resin hardens, the two are found strongly united. The mould is then turned on the lathe, and a chisel is applied to the mould to make it symmetrical and to cut the rings on it which the vessel should have. When this is completed, the chisel is gently inserted between the bottom of the mould and the lump of lac and the mould is separated from the lathe. Then the mould is plastered over with wax, or rather with a mixture of wax, rosin and sweet oil. The coating of wax is made of the thickness of the intended vessel. Over the layer of wax a coating of clay is put. To give fixity to the apparatus three small nails are driven at the bottom through the three coatings.

The next step is to take the crucible, which has got its charge of metal and has been covered with clay, and to make a small hole near the edge of its cover. A spout of wax covered over with clay is attached to both the mould and the crucible so as to connect the interior of the crucible with the space in the mould between the two layers of clay. Then the mould and the crucible are incorporated into one mass by thickly coating the whole exposed surface of the two with clay. The mass (with the crucible below and the mould on the top) is dried in the sun. It is placed in the same position in the furnace.

The furnace is of simple construction and consists of a pit or hole in the ground about 18 inches deep. The interior walls are spherical, the bottom being flat. The mouth of the pit is covered with stiff clay. This cover is perforated with holes and serves the same purpose as the iron gratings of an oven. The mouth is surrounded with a low wall about a span high, with unbaked bricks. Charcoal fire is put over this mouth-piece. An aperture on the level of the floor of the furnace is made, and through this aperture, blast is supplied by bellows which are worked by hands. The fire being made, the mass of clay, containing the crucible below and the mould above, is placed on it. Dry cow-dung cakes are heaped over and around it; and on the top of this heap of cow-dung cakes, pieces of broken tiles are placed, to prevent the heat from escaping. Then the bellows are plied, till the alloy is thoroughly melted. Experts make this out from the hue of the smoke which escapes from the furnace. The mass is then taken out of the buried heap of fire, and, to make assurance doubly sure, is shaken, to see whether the materials with which the crucible was charged have thoroughly melted. It is then turned upside down, so that the crucible is on top and the mould below, and in that posture it is allowed to stand till it has cooled. The molten alloy in the crucible finds its way through the spout into the empty space in the mould between the two clay coatings in the place of the wax layer which has been consumed and disappeared. When the mass has cooled down, the clay is broken off, both inside and out, with a chisel. This has to be done very carefully, otherwise there is risk of breaking or cracking the vessel, which in its

crude form is very brittle. To temper it, the vessel is again heated in the fire and immersed in cold water. It is then turned on the lathe and a file applied to smooth and clean it.

No device for plating is resorted to, but to give the surface a brilliant appearance it is turned on the lathe and rubbed with a polishing stone and sweet oil.

14. In Saugor the process of making alloys is described as follows :—

A circular hole is dug in the ground, proportionate to the quantity of alloy prepared at a time. The biggest factory in the district usually prepares half a maund at a time. The hole is then $1\frac{1}{2}$ ft. deep with 7 ft. circumference. A wall 1 foot high is raised all around the hole with an equal circumference, leaving an aperture in front for the bellow to be fitted in. Two earthen semi-circular lids are made to cover this hole in such a manner that when they are put up they leave a small opening in the centre for the smoke to get out. A pair of bellows is fitted into the aperture, left for the purpose, in the raised wall described above. An open crucible is made of mud mixed with chaff. The furnace is filled with wood, and the crucible, filled with proportionate amounts of the metals, is placed inside. The semi-circular lids are then placed over the opening and bellows worked for about 3 hours, when the worker feels with an iron stick whether the metal has been liquified and mixed together, and then with a large pair of iron tongs takes the crucible out and pours the contents on the moulds made for the purpose.

At Tigoda bell metal furnaces are peculiarly made. A hole three feet deep with a diameter of $1\frac{1}{2}$ feet is dug in the ground, an earthen pitcher being buried in the bottom with its mouth upward. Besides this an equally deep but small hole is made, and is connected underneath with the other hole which is the furnace. No bellows are required. A small carpet is spread on the small hole, the further ends being kept in their places by the feet, the nearer end being moved up and down a distance of 6 inches, and this fans the furnace effectually.

The process of casting is much the same as that of brass ware, but as it requires special care, it may not be out of place to give details. The artizans generally possess metal moulds of certain articles, such as *lotas*, &c., which they cannot easily fashion by hand symmetrically. These are exact models of the articles bisected vertically. The mould is made by filling up clay in these. On the removal of the model, there is left behind a solid mould of the article to be cast; sometimes with skilful manipulation the mould can be made hollow also. The materials of which the mould are made is soft clay powdered and strained through a sieve mixed with fresh cow-dung in the proportion of 2 to 1. The moulds are then dried and turned on a lathe.

The next process is the wax coating. For this purpose a mixture of 2 parts of wax, 16 of rosin and 5 of sweet oil is made by heating together all the ingredients and straining through a cloth. The mixture is then allowed to cool and solidify, after which it is pulled, out and in, several times and then again put on the fire with a little water and wax. After being again allowed to cool, it is beaten out into a sheet of the thickness of the vessel to be made. The sheet is then cut into strips which are applied by hand to the clay mould aforesaid. The whole is covered with a mixture consisting of clay, sand and cow-dung in equal proportions and dried in the shade. This layer is again coated with clay, strengthened with fibre and dried in the sun. To the mouth of the pot a strip of wax is added, to which a funnel-shaped mouth is joined. The next process is to take out the wax from the mould. The moulds are placed on a fire of dried cow-dung cakes. The melted wax is removed by means of a stick dropped alternately in water and into the liquid wax, and this is continued as long as the ebullition continues. About $\frac{1}{3}$ of the whole quantity is thus obtained, the remainder being consumed by heat. The next thing is to take a crucible made of black clay, cow-dung and chaff and to fill it with pieces of metal with a little salt. This is fixed to the funnel-shaped mouth of the mould with clay and dried. The mass is then put on the furnace, the crucible being below. When the alloy has thoroughly melted, the mass is taken out and turned upside down as in the case

of casting brass. The molten metal occupies the place left hollow by the wax mixture being taken out. When the metal has completely cooled, the clay is broken off, both inside and out, and the vessel, after being cleansed, is turned and polished on the lathe. The pots being cast, the irregularities are smoothed off with files. One man is able to thus finish off eight *lotus* in a day. Finally, the pots are turned on a lathe and polished by chisels and by a polishing stone applied with sweet oil. Pots containing a larger proportion of zinc are more easily finished off and generally cheaper for two reasons, *viz.*, the comparative cheapness of zinc as compared with copper, and the smaller amount of labour involved in preparing articles from alloys containing an excess of zinc.

15. The brazier in Chanda confines himself solely to the manufacture of copper,

**The brazier and his
remuneration.** brass and bell metal ware. It is not he who imports the material from Bombay, but dealers and traders in domestic and other vessels. They make the raw material over to the *Panchal* (brazier) who turns out whatever may be required.

The remuneration obtained just affords a bare subsistence. In the case of brass,—on 21 seers copper and 7 seers zinc—the remuneration is Rs. 12, but of this Rs. 12 the brazier himself only gets the benefit of Rs. 5, as charcoal costs him Rs. 3, the hired men who beat out the ware cost Rs. 3 more, and Re. 1 is expended in solder. Five or six pots are turned out, each selling at Rs. 4 or Rs. 4-8-0, the dealer securing a profit of about five per cent. The time taken is about a fortnight, so that if the *Panchal* has a constant supply of work, he may be able to earn Rs. 10 in a month, but the work, unfortunately for the *Panchal*, reaches him rather intermittently.

In the manufacture of copper ware articles the *Panchal's* gross remuneration is at the rate of annas eight per rupee value.

A considerable trade is done in the re-casting of old, disused and broken vessels. The material in this case is purchased at a low rate, and the re-cast article gives a considerable profit to the dealer.

16. Several other district reports agree in stating that the brazier's emoluments are far from large. In Hoshungabad, however, he earns a little more than the above. The following statement of the profits of the industry is given :—

From a brass sheet of one maund in weight about 20 *gunds*, of 2 seers each in weight, can be made, and the following is the approximate expenditure :—

				Rs.	a.	p.
1 Brass sheet...	...	...	...	36	0	0
2½ Maunds, of charcoal	...	...	...	2	0	0
Labour	...	...	...	5	0	0
Vitriol	...	...	...	0	5	0
Sulphuric acid	...	...	...	0	2	0
Pitch, ochre and oil	...	...	...	0	1	3
Total...Rs.				<u>43</u>	<u>8</u>	<u>3</u>

The sulphuric acid is required for cleaning the surface of the wares. One tola of the acid is put into 10 or 12 seers of water and the pots are soaked in the mixture. Pots manufactured from one brass sheet are said to fetch a price of about Rs. 50. They are sold by weight at about 15 annas a seer.

There are very few Kaseras who have shops of their own for the manufacture and sale of their wares. Most of them turn out work as journeymen smiths. They get wages at 7 annas a seer of melted brass and at 4 annas a seer of sheet brass. Kachhis, Raghbansis, Ahirs, Jats and others work as labourers in Kasera's shops and are paid at from 3 to 4 annas a day.

17. In most villages where the brass and copper industries are represented,

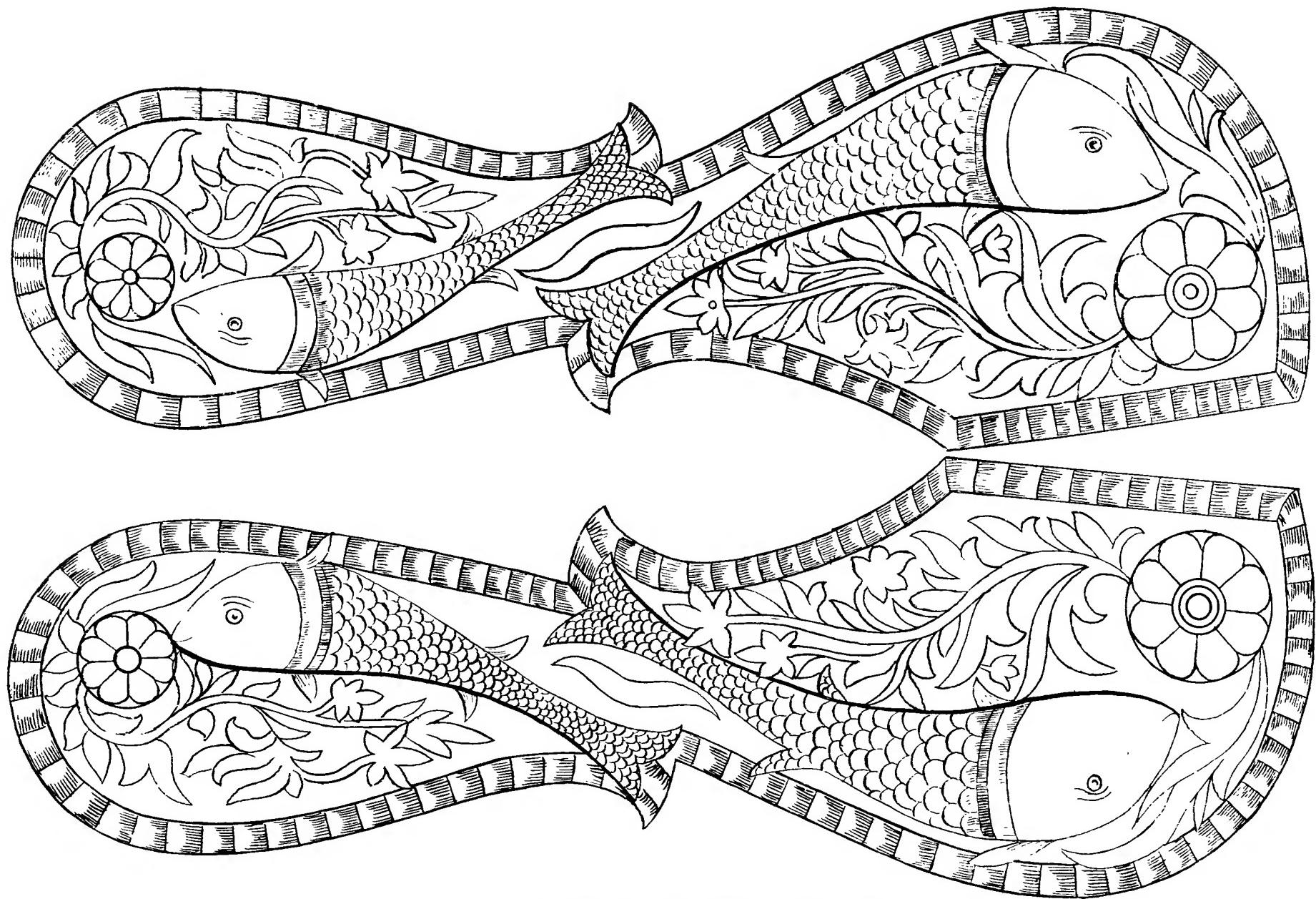
The articles manufactured.

little beyond the manufacture of the bowls and dishes, pots and pans, in every day use is attempted ; but in a few places idols, worshipping vessels, ornaments for women or cattle, bells for cattle, tobacco pipes, musical instruments, bangles, rings, toys and occasionally other articles are produced. Bhaudara produces a large number of bells for putting round the necks of cattle and supplies them to the surrounding districts. In Chanda vessels of copper and sometimes of brass are made for use in worship, the idol being placed and washed in them. Also a small trade is done in brass and bell metal ware in the way of ear ornaments and bangles and rings. These ornaments, however, are only worn by the lower castes, and the regular *Panchal* thinking it rather beneath his dignity to manufacture such articles, they are manufactured by another caste known as *Watari*. A trade is done also in ornaments for bullocks, the well-to-do *malguzars* and *Seths* delighting to see the tops of their bullock's horns tipped to the extent of about three or four inches with a cone of brass. The necks of the bullocks also are frequently graced by a necklace of brass made in the shape of a linked chain of the figure 8 pattern. In addition to this, the bullock's neck is also frequently ornamented with a number of bell metal hollow globes, varying from one inch to two inches in diameter, with a small opening into which stones are dropped. These ornaments are known as *ghoongros* and the sound from them is not at all unpleasant when borne in upon one on the still evening air.

In the way of ornamental work, only inscribed and scroll work is attempted, but some of this is of the most artistic kind. There are two or three artisans in Baboo Pett whose work has received certificates of merit in the different exhibitions that have taken place within the last eight or ten years in different places in the Central Provinces. Occasionally they work the upper and lower portions of *lotas* and drinking vessels in brass which is artistically inscribed, while the centre of the vessel is made of burnished copper, the effect being particularly pleasing. Lamps, also, of graceful shape and charming workmanship are turned out by these men ; but such things, not being much in demand, are only taken in hand when specially ordered. Patterns of any description are wonderfully well copied, but the capacity for original design does not seem to flourish over a large field.

Of Saugor it is said that the most important article that is made of copper in that district is a musical horn called *ramtula* used in wedding ceremonies and other festival occasions. Its preparation requires special skill ; hence only a few artizans can make it. Malthone is the only place where it is manufactured, and there, too, by a single family. The weight of this instrument ranges from 2 to 5 seers, and its price ranges from Rs. 5 to Rs. 15 each. *Ramtulas* made at Malthone are exported for sale to considerable distances. Another instrument called *turbi* is also manufactured at Malthone. It is shaped like an English bugle and generally used by *Bairagis* at their conferences.

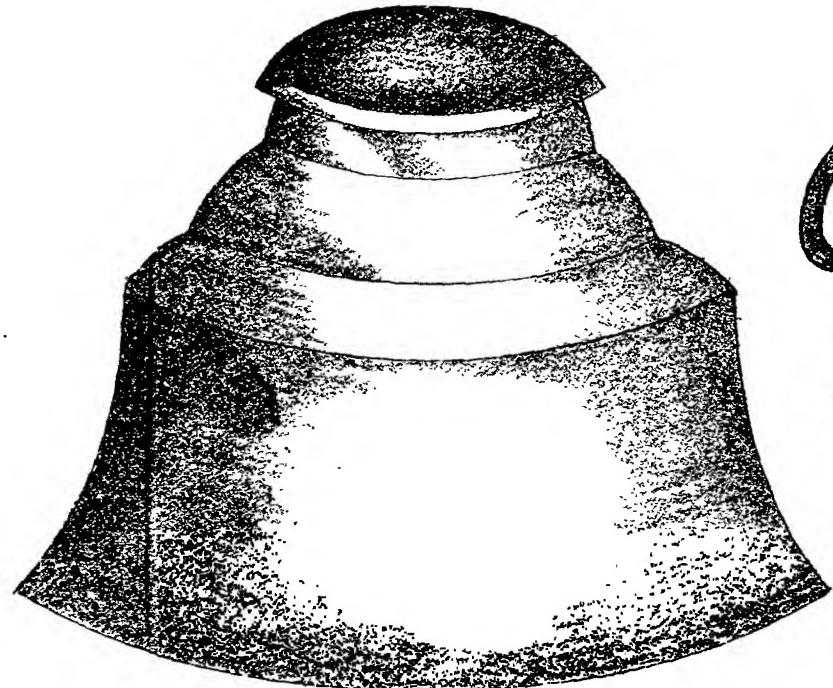
18. Appended will be found drawings of specimens of brass ware from the Saugor, Nimar and Bhaudara Districts.



BRASS SANDALS

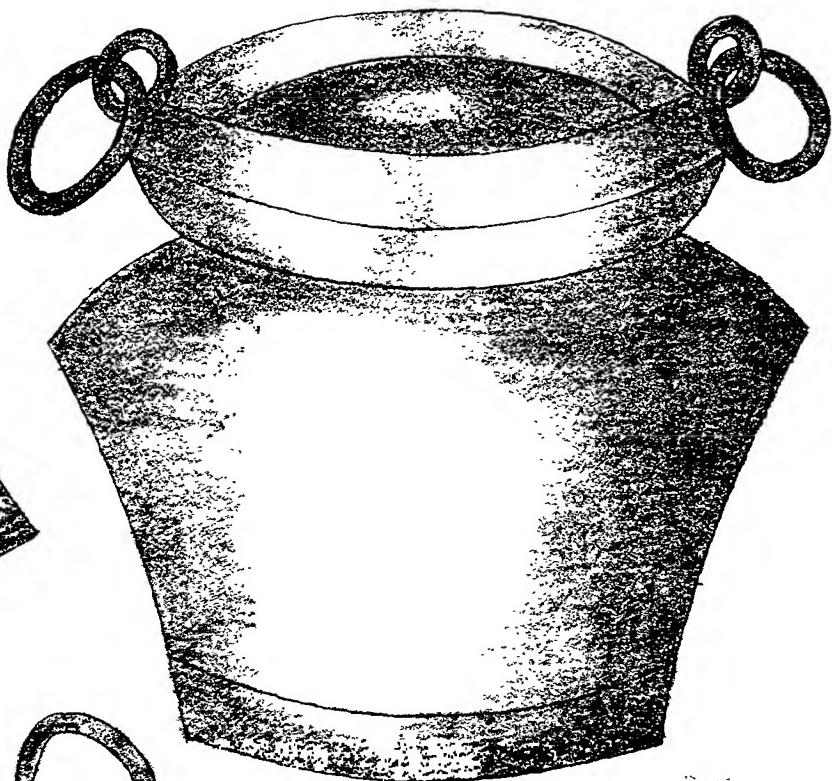
SAUGOR DISTRICT.





CHURWA.

Used for keeping water in at home.



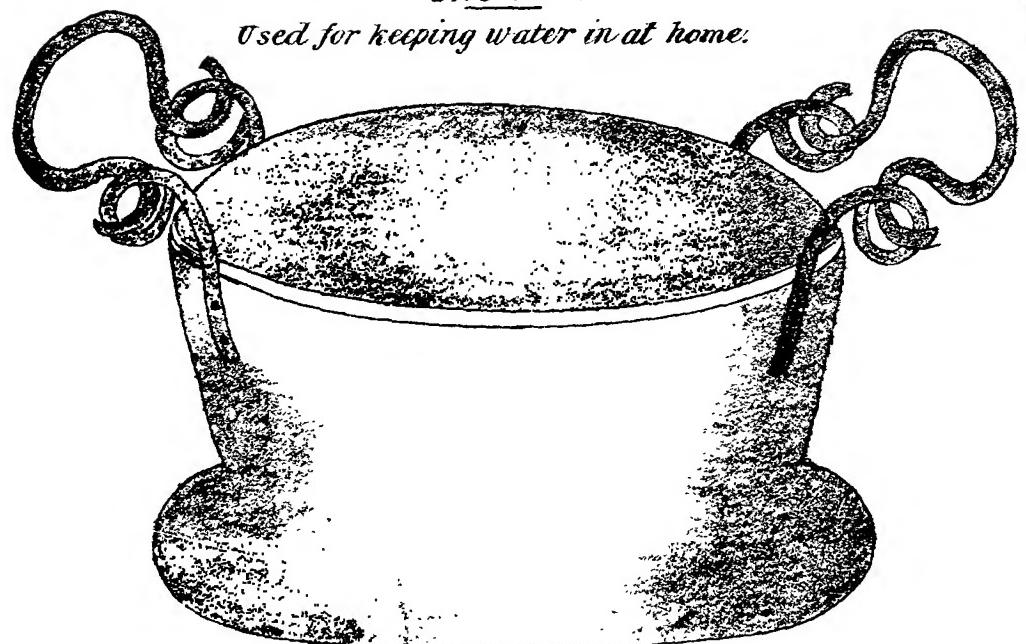
GUNGAL

Used for keeping water in for domestic purposes.



GURRAH.

Used for fetching water from well or stream.



DOOKRI.

Used for warming water for baths, &c

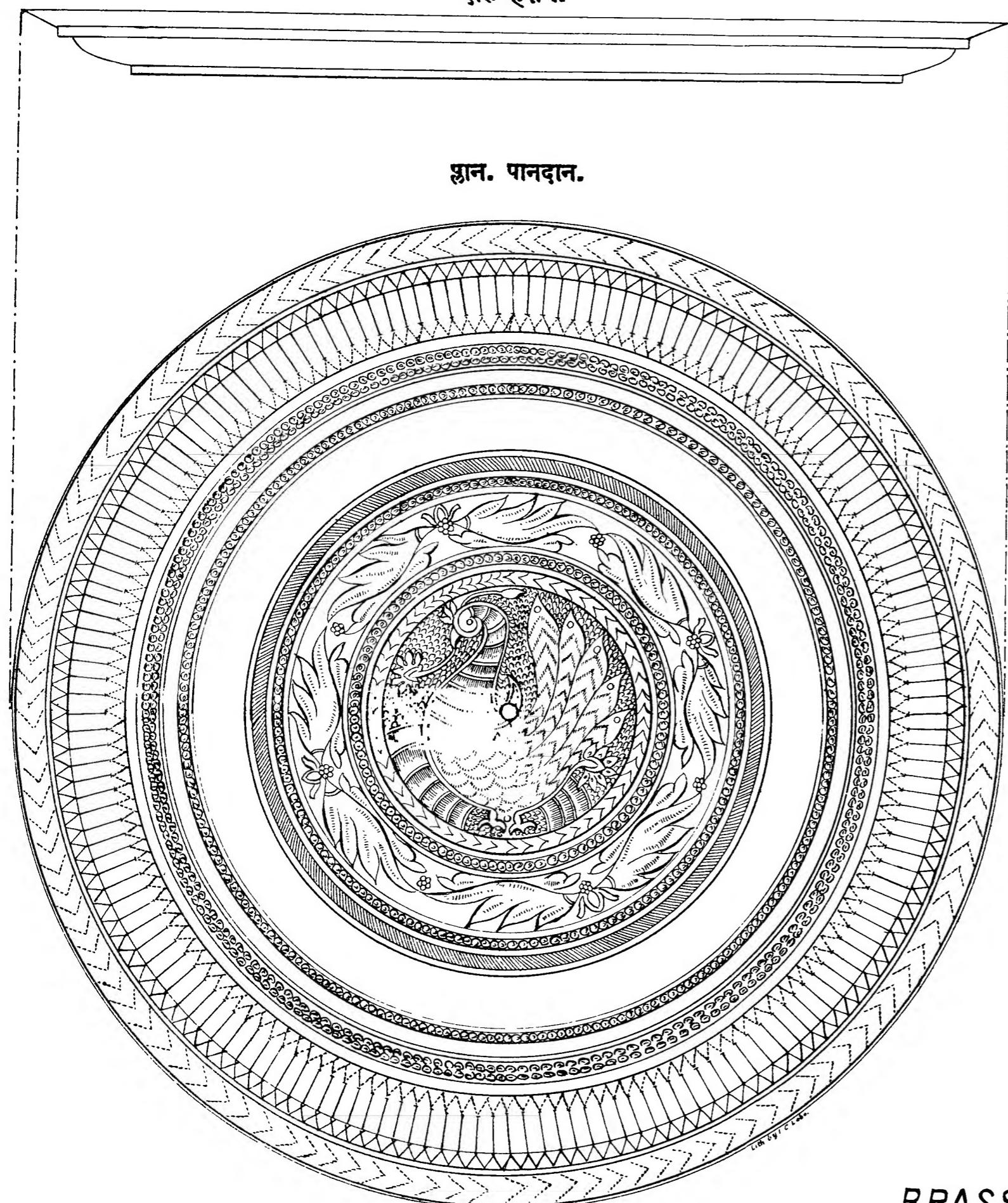


KUDHAI.

Used by Sweetmeat makers generally. -

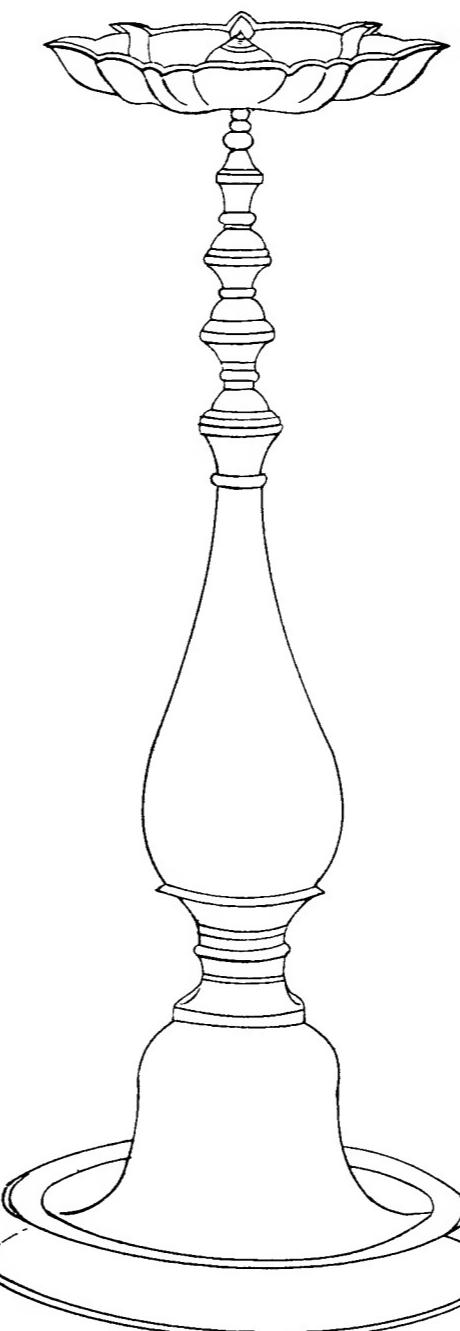
Five descriptions of Copper utensils made in Nimar District.

एलिवेशन.



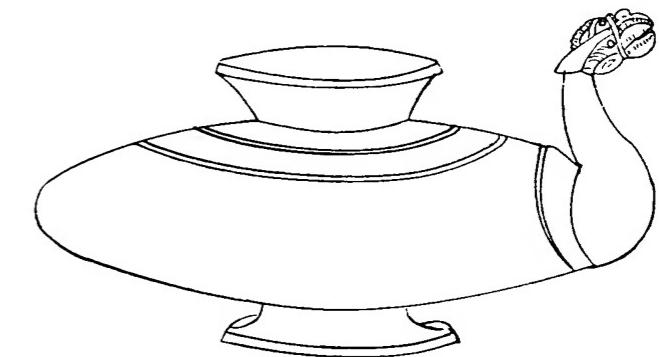
पान दान.

समई.



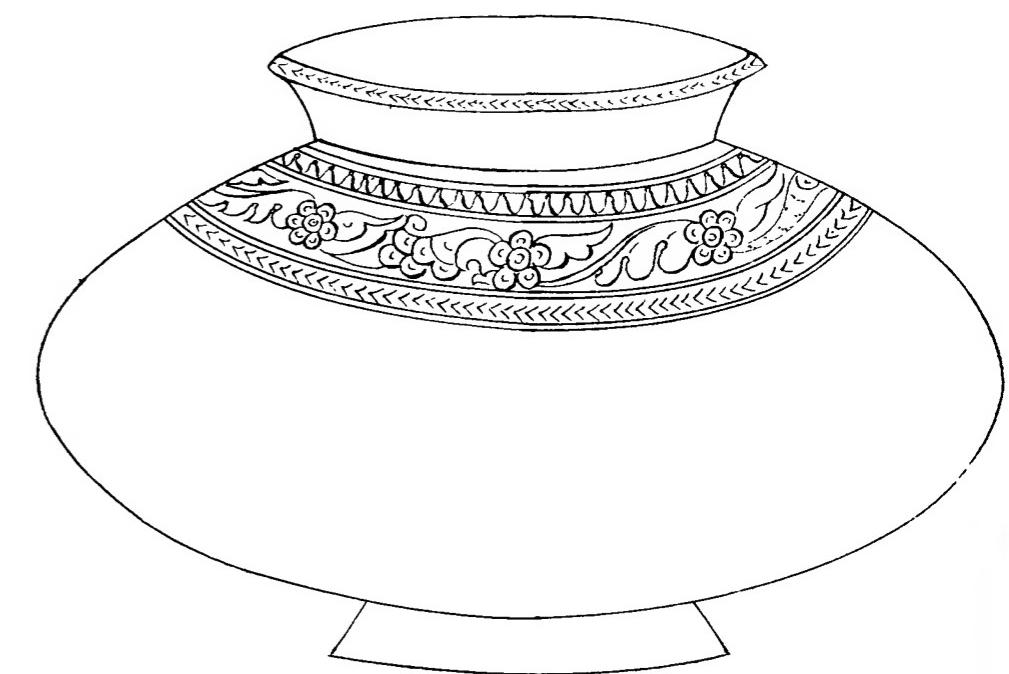
Samai lamp.

झारी.



Jhari.. Vessel out of which oil or ghee is poured

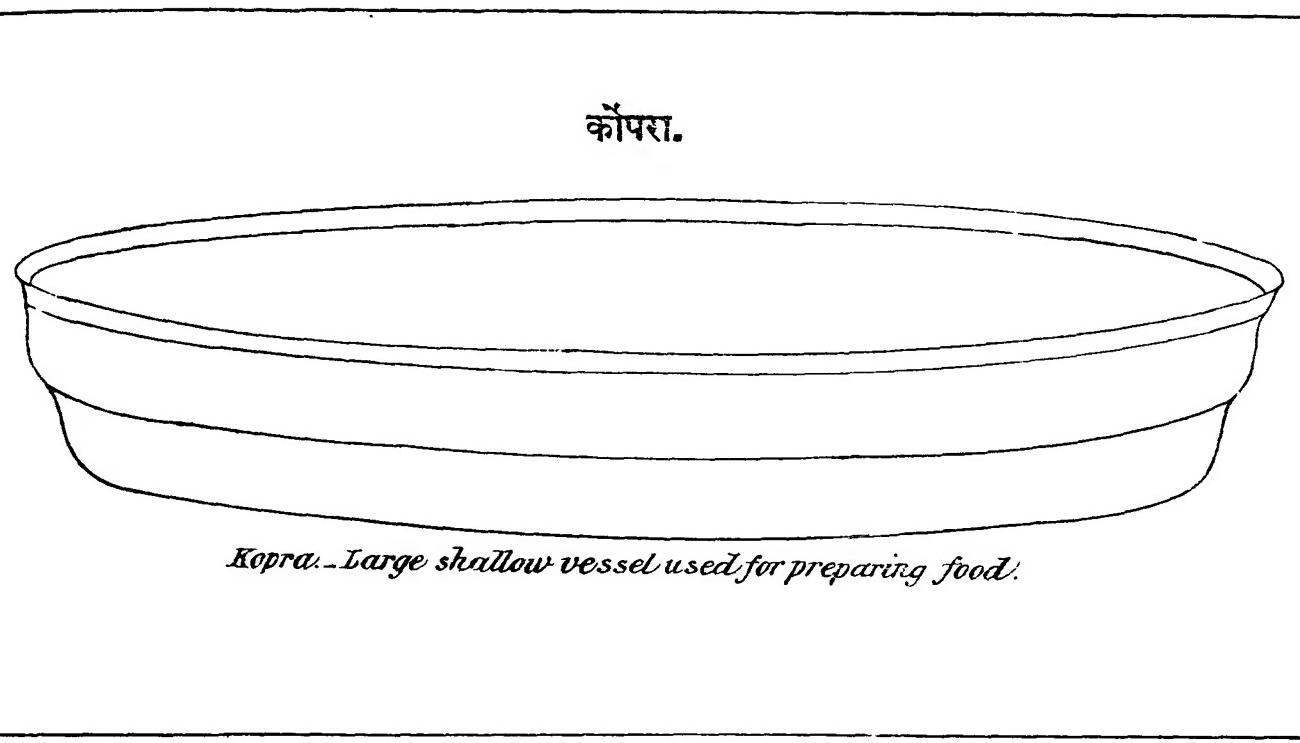
गडवा-पैंधीचा.



Garwa pendicha - drinking vessel with a pedestal.

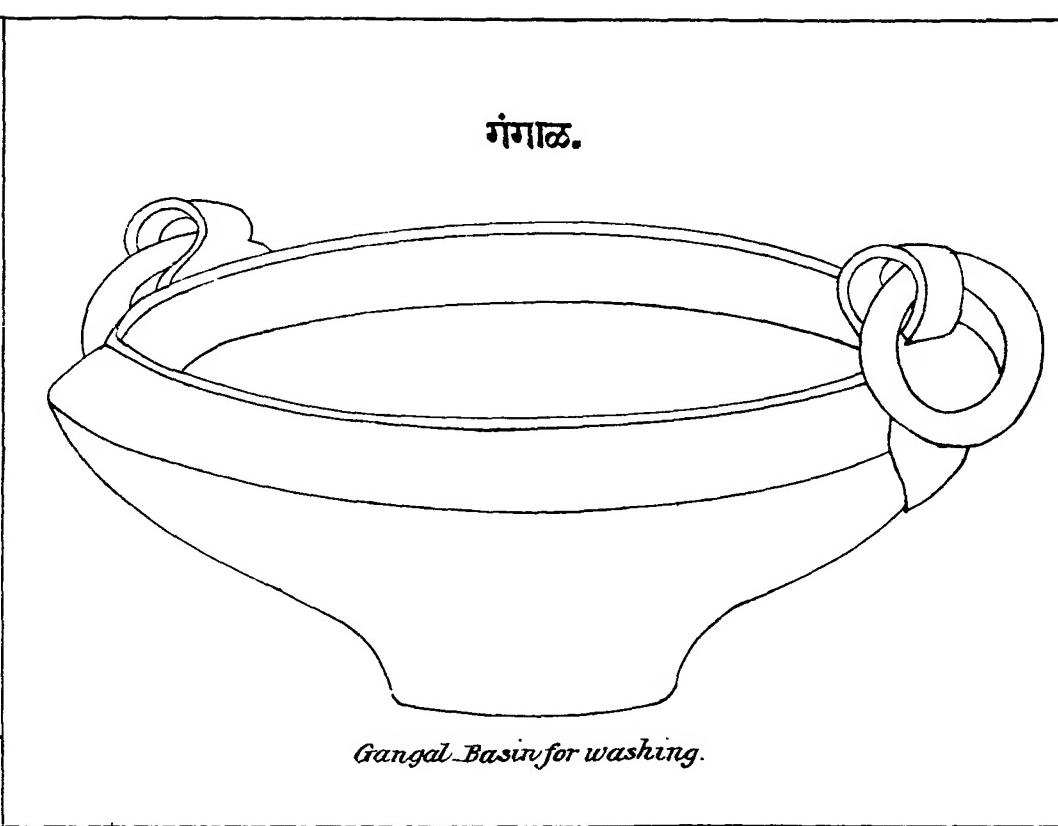
BRASS WARE BHANDARA DISTRICT

Pan dan.. Dish for holding pan.



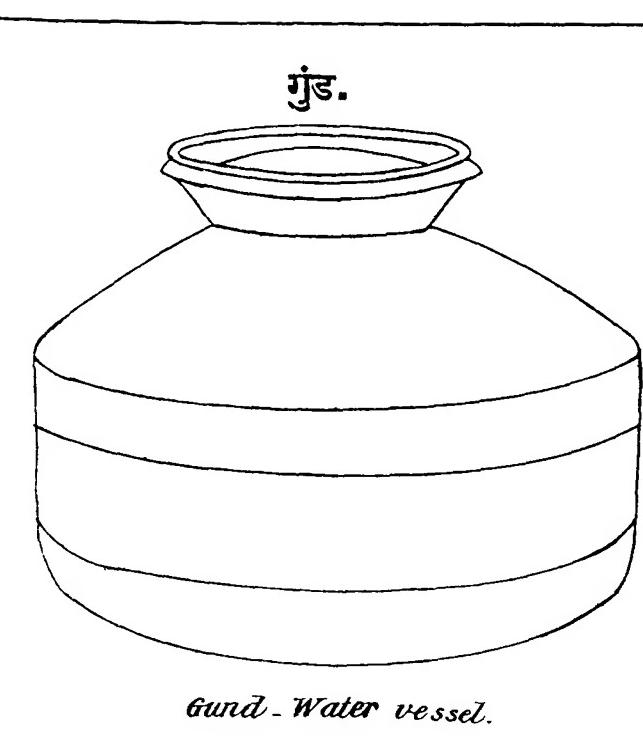
कॉपरा.

Kopra.- Large shallow vessel used for preparing food.



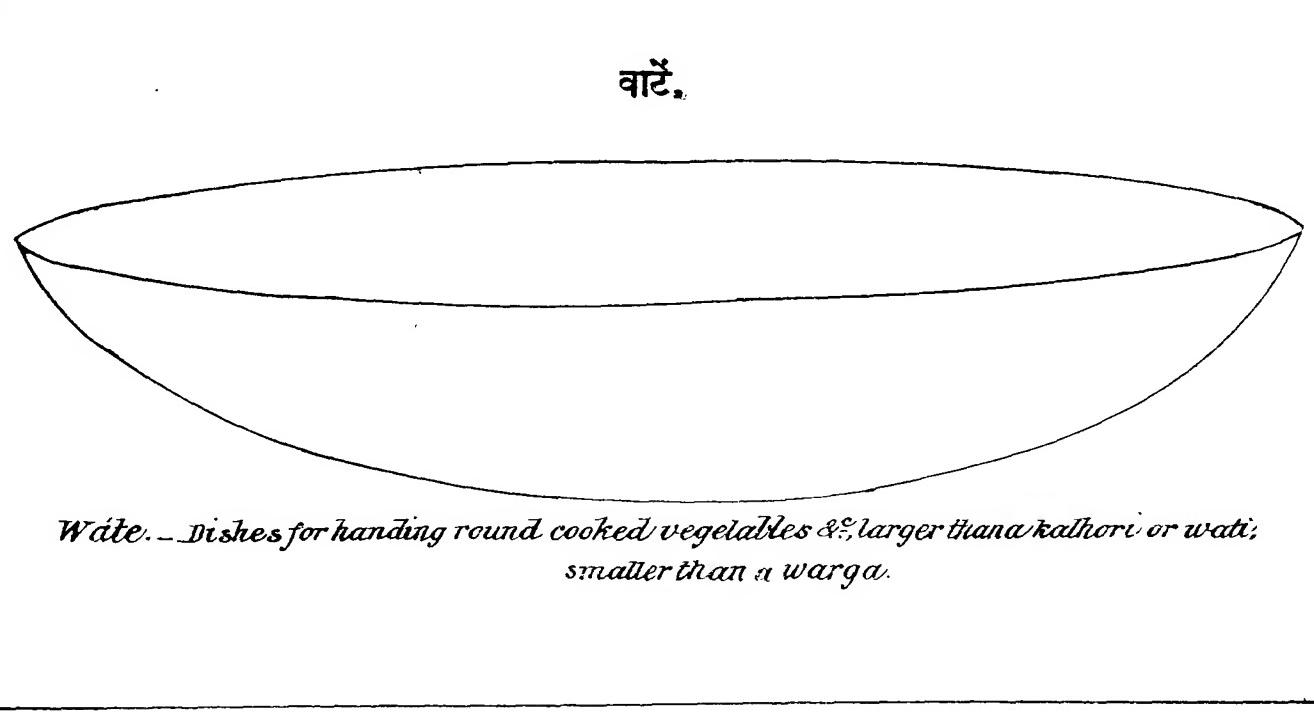
गंगाल.

Gangal-Basin for washing.



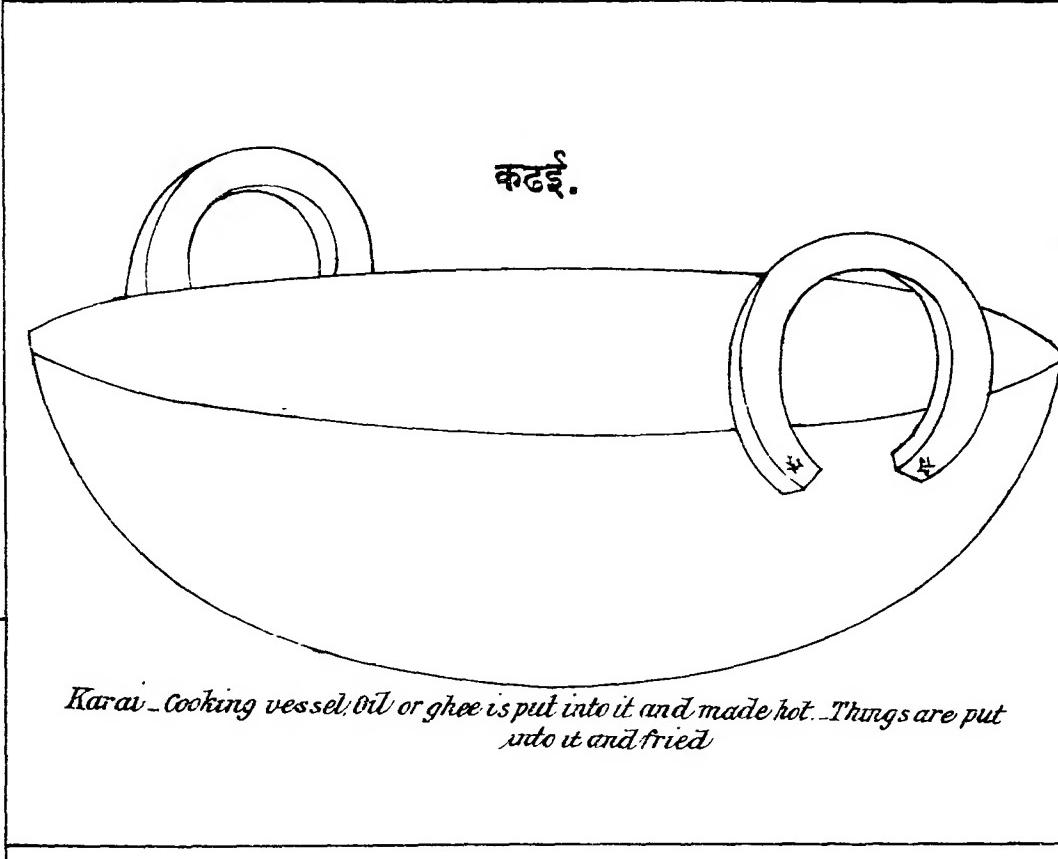
गुंड.

Gund.- Water vessel.



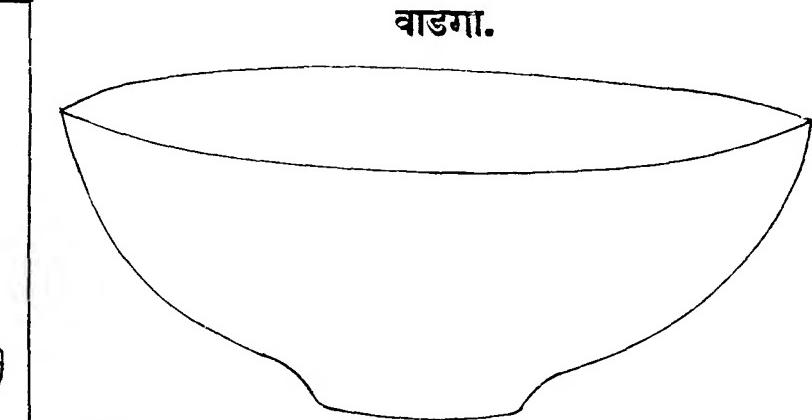
वाटे.

Wate.- Dishes for handing round cooked vegetables &c; larger than a kallori or wati; smaller than a warga.



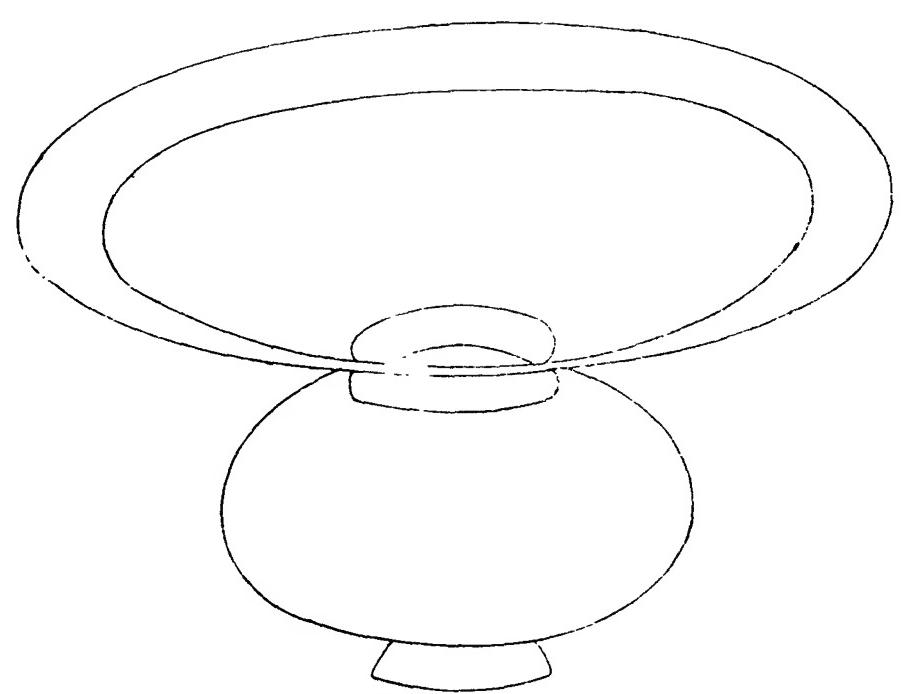
कट्टर.

Karai.- Cooking vessel. Oil or ghee is put into it and made hot. Things are put into it and fried.



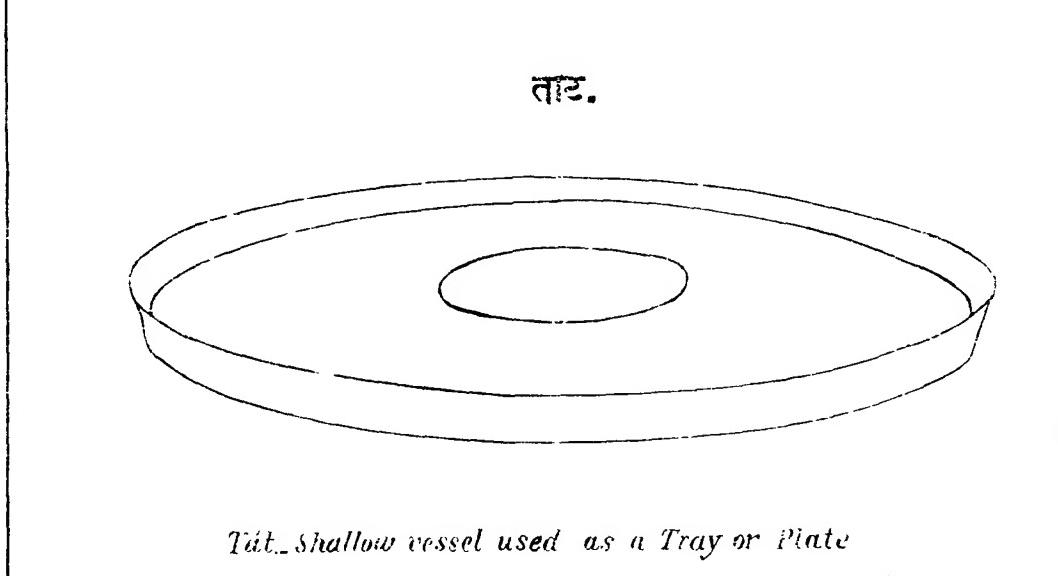
वाडगा.

Warga.- large Vegetable &c dish,for handing round at meals.



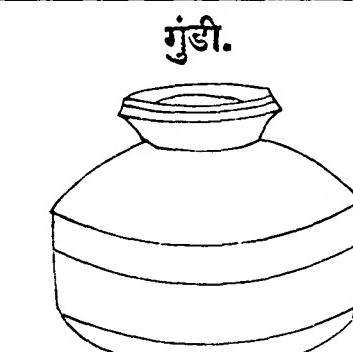
तस्त.

Tast.- for feet-ashing at marriages, or for a spittoon at large gatherings.



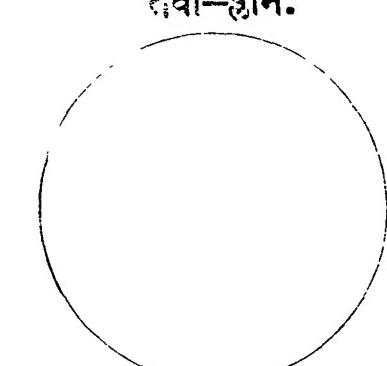
ताट.

Tat.- shallow vessel used as a Tray or Plate



गुंडी.

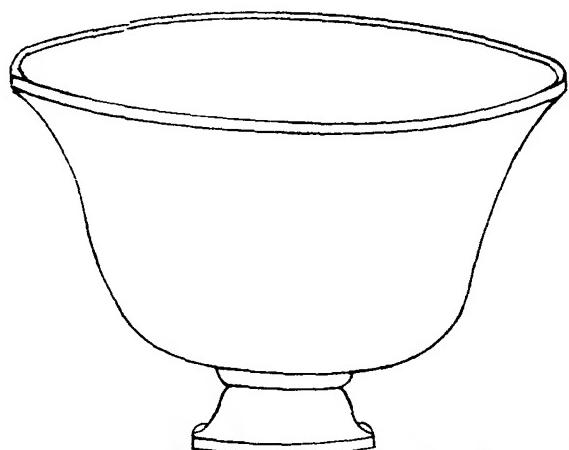
Gundi.- Small water vessel,also used as a cooking utensil.



तावा-मुन.

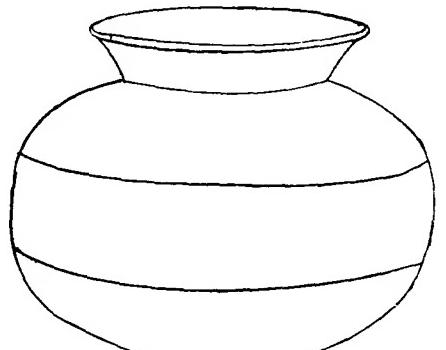
Tawa.- Plate used for Cooking Chapatis &c.

जांब.



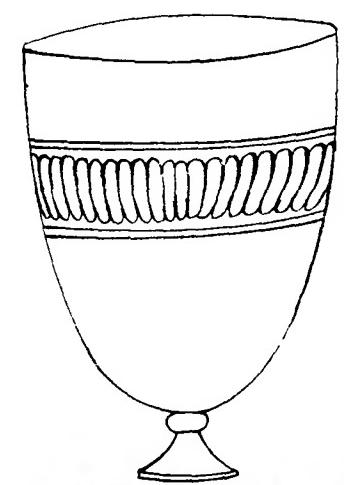
Jamb... Cup for drinking water.

कुण्बाऊ गडवा (लोटा).



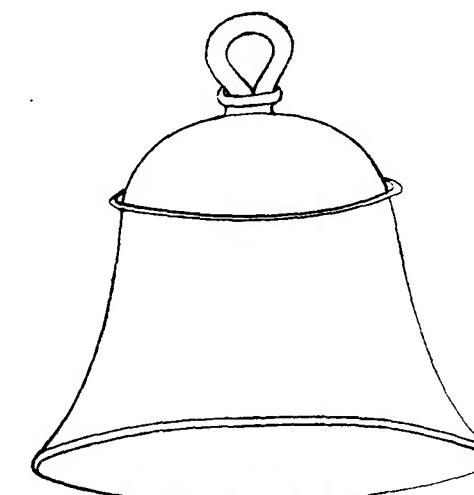
Rundao garwa or lota... vessel used for drinking water &c.

ग्लास.



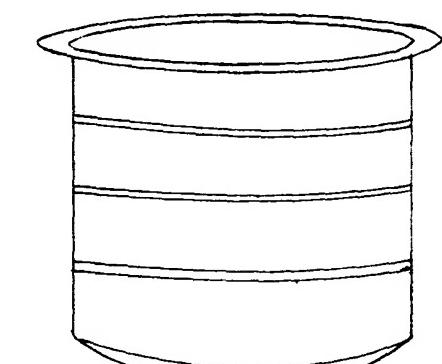
Glass... drinking cup.

घंटा.



Ghanta... bell.

गंज.



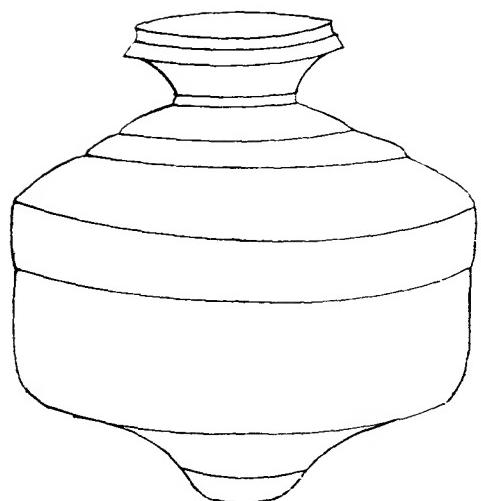
Gang... Cooking vessel.

चंबू.



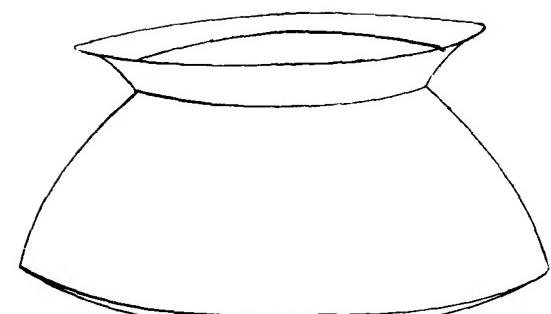
Chenbu... water vessel

घडली.



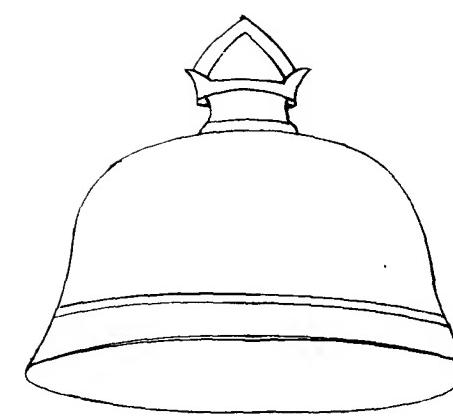
Gharlu... vessel for fetching water in... also called Ghagar.

सताल.



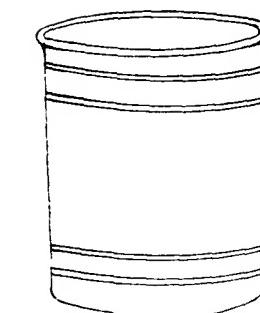
Satal... cooking vessel

घंटी.



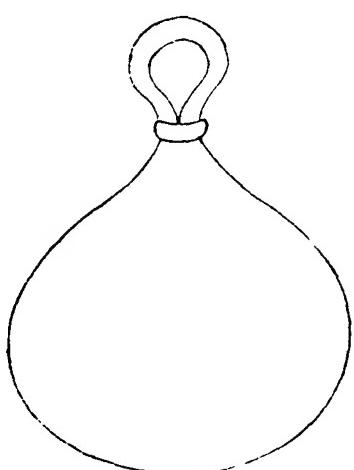
Ghanta... small bell

पंचपात्र.



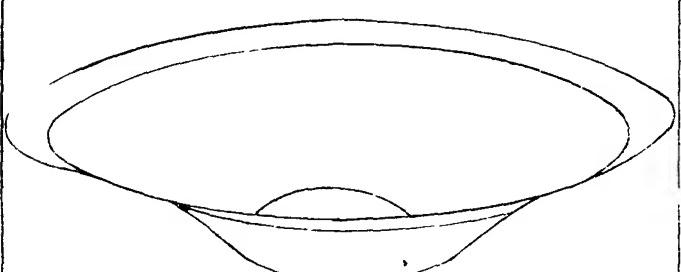
Panchpatr... Cup for drinking water.

घोलर.



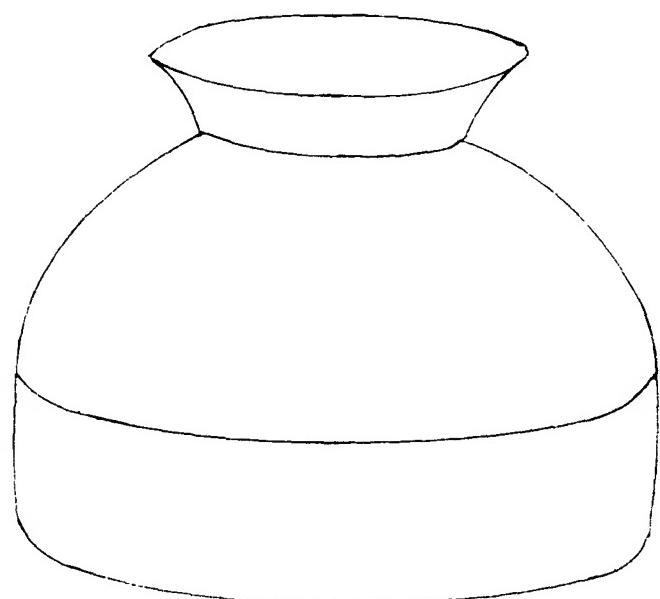
Gholar... Bell for cattle

झांकणी.



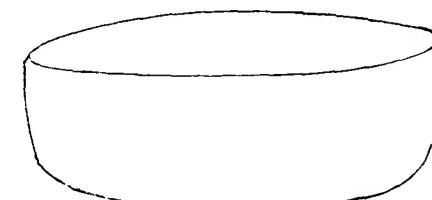
Shanknu... Cover for the gay or satal.

चरवी.



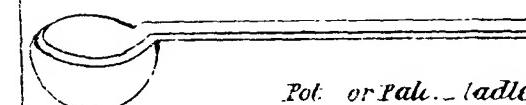
Charuu... cooking vessel, also used for keeping milk, ghee, &c. in

वाटी.



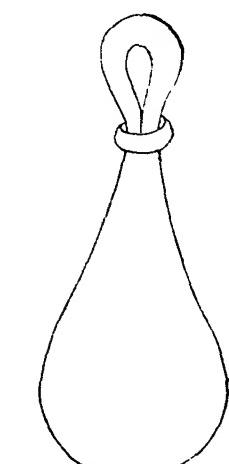
Wati... Also called kathori; small eating vessel.

पोळ किंवा पळी.



Pot. or Pale... ladle.

धुंगरू.



Dhungru... Small bell to put on the neck of cattle, two at least of these must be used with the gholar, one at least on each side

ν_{ζ}

$\alpha t, \beta t, \gamma t$

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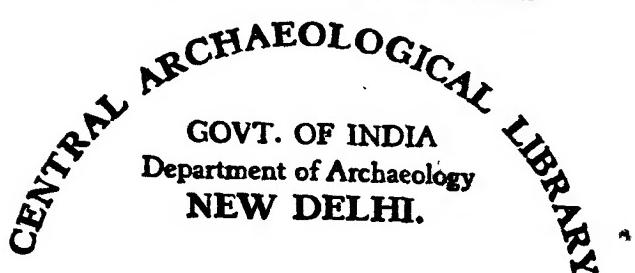
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